DOCUMENT RESUME

ED 032 178 RC 003 646

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Migrant Children...Outdoor Education's Role in Language Development.
Ohio State Board of Education, Columbus.
Pub Date 69
Note-29p.; Presentations given at workshop held at the Glen Helen Outdoor Education Center (Yellow Springs, Ohio, May 8-10, 1969).
EDRS Price MF-$0.25 HC-$1.55
Descriptors-Curriculum Development, Environmental Education, *Environmental Influences, Instructional Materials, Language Arts, *Language Development, Language Handicaps, *Learning Activities, *Migrant Children, *Outdoor Education, Teacher Attitudes, Teaching Techniques, Vocabulary Development

Four presentations were given at a workshop conducted to consider ways in which outdoor education activities could be utilized in the teaching of language skills to migrant children. Dr. William B. Stapp, University of Michigan, discusses the need for and major objectives of environmental education, and suggests points to consider in relation to the curriculum. Dr. Thomas M. Stephens, University of Pittsburgh, discusses methods of using environmental conditions for language acquisition. Emphasis is placed on external conditions which influence learning, i. e., teacher attitudes, instructional skills, and stimuli available for responding behavior. Instructional materials for outdoor education is treated by Dr. Carl S. Johnson of Ohio State University. He also lists recommendations for teachers seeking materials for outdoor education. Dr. Mary Harbage, Wright State University, relates outdoor education to language arts offering various suggestions for creating learning opportunities. Possibilities for developing outdoor education concepts on school grounds are given. (CM)

ED032178

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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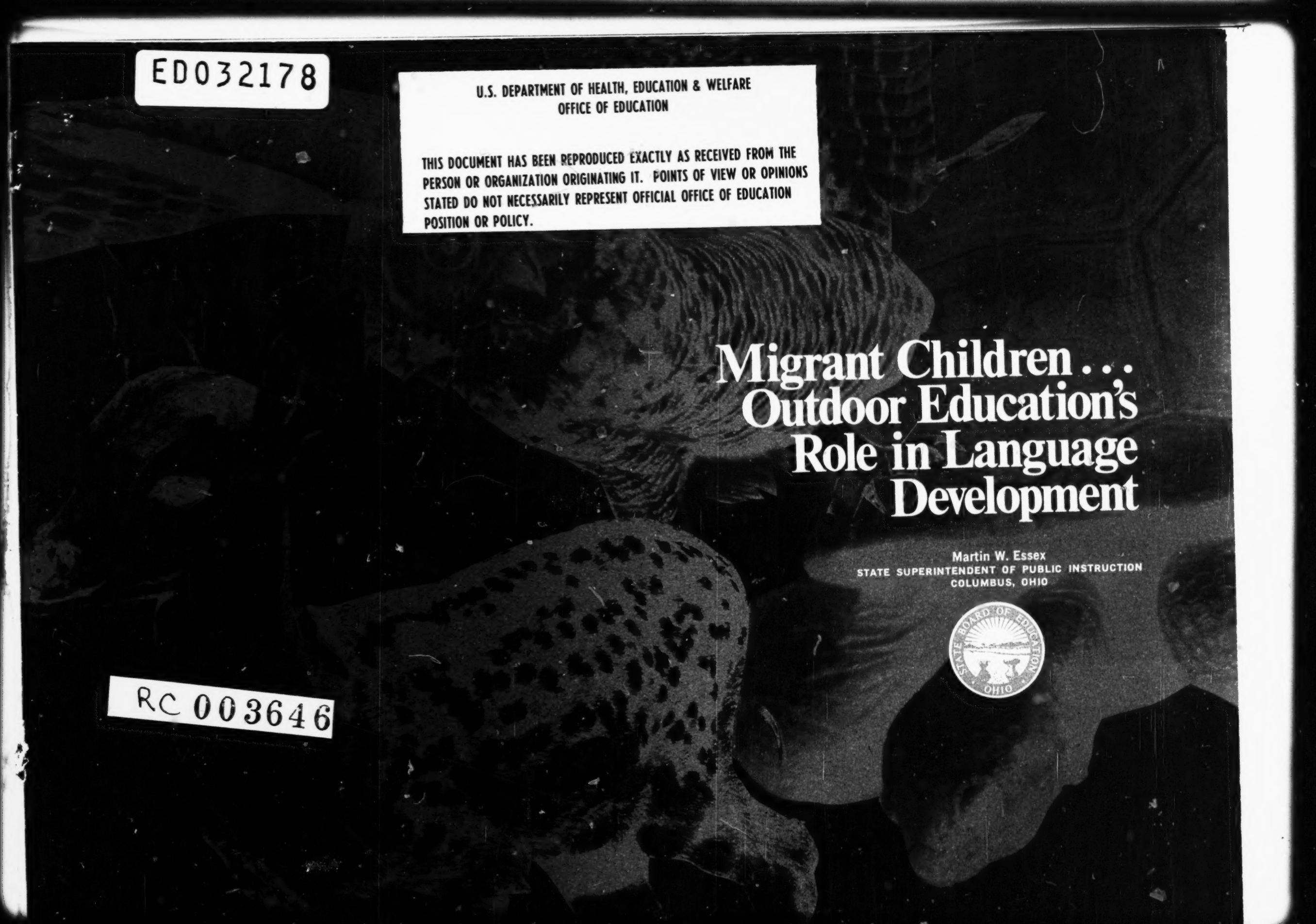

Migrant Children . . . Outdoor Education's Role in Language Development

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RC 003646

Foreword

Perhaps no national or local effort could have greater value than implementing educational programs designed to improve the opportunities of children of migrant agricultural workers. Today under conditions of general affluence it is estimated that the average yearly income of a migrant worker is $1,500.00. Because of the conditions imposed by migration, approximately 90% of the children of migrant workers never complete school. In a technological society the demands for a highly educated citizenry are great. Persons with less than a high school education are markedly disadvantaged. Their ability to contribute to the larger society is only exceeded by their ability to assume a role of self-sufficiency and personal dignity.

One of the several programs designed to attack the educational problems of the migrant child is Title I, P. L. 89-750 of the Elementary and Secondary Education Act. The task of educating the migrant child is not an easy one. The short term duration of his enrollment, and the language handicap are two of the most pressing challenges faced by educators in the design of local programs.

The purpose of this workshop which was conducted May 8, 9, 10, 1969 at the Glen Helen Outdoor Education Center, Yellow Springs, Ohio, was to consider ways in which outdoor education activities could be utilized in the teaching of language skills to migrant children.

As Director of the Division of Federal Assistance, Ohio Department of Education, I would like to acknowledge and extend my appreciation to the seminar participants. Special appreciation is extended to Doctors Mary Harbage, William Stapp, Tom Stephens, and Carl Johnson whose presentations are included in this publication.

For making the seminar arrangements and for the editing and preparation of this report, we are indebted to the School Management Institute.

R. A. Horn, Director
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Children and the Outdoor Environment

William B. Stapp

Within the past fifty years, the United States has become a predominantly urban nation, both in thought and in physical character. Large and middle-sized communities, many within complex urban regions, have evolved to where over seventy per cent of this country's population resides on one and one-half per cent of the nation's land surface. By 1980, eight out of ten Americans will probably live in an urban environment. Consequently, the independent rural-oriented living that once characterized this country's social and political heritage is no longer a dominating influence in the lives of most Americans.

In rural surroundings, direct daily contact with the basic natural resources was prevalent, especially within man's immediate environment. As man became progressively urbanized, his intimate association and interaction with natural resources diminished and, with it his awareness of his dependency on them. Yet, it is imperative that man, wherever he lives, comprehends that his welfare is dependent upon the "proper" management and use of these resources.

Man should also have an awareness and understanding of his community and its associated problems. Our communities are being plagued with problems such as: lack of comprehensive environmental planning; indiscriminate use of pesticides; community blight; air and water pollution; traffic congestion; and the lack of institutional arrangements needed to cope effectively with environmental problems. While these problems are legitimate concerns of community governmental officials and planners, the responsibility for their solution rests, to a large extent, with citizens.

To an increasing extent citizens are being asked to make decisions that affect (directly and indirectly) their environment. Specifically, citizens make these decisions as they *cast* votes on community issues; as they *elect* representatives to policy-making bodies; as they directly *act* upon the environment itself. Citizens can be effective in influencing sound policy in other ways. They can ask informed questions, at the proper time, of the right people. They can serve on advisory and policy-making committees. They can support sound legislation directed at resolving environmental problems. To perform these tasks effectively, it is vital that the citizenry be knowledgeable concerning their biophysical environment and associated problems, aware of how they can help solve these problems, and motivated to work toward effective solutions.

Most current programs in conservation education are oriented primarily to basic resources; they do not focus on the community environment and its associated problems. Furthermore, few programs emphasize the role of the citizen in working, both individually and collectively, toward the solution of problems that affect our well being. There is a vital need for an educational approach that effectively educates man regarding his relationship to the total environment.

The Supreme Court decision regarding the one-man, one-vote concept, that has enabled the increasing urban majority to acquire greater powers in decision-making, makes it imperative that programs developed for urbanites *be designed with them in mind.* It is important to assist each individual, whether urbanite or ruralite, to obtain a fuller understanding of the environment, problems that confront it, the interrelationship between the community and surrounding land, and opportunities for the individual to be effective in working toward the solution of environmental problems.

This new approach, designed to reach citizens of all ages, is called "environmental education." We define it in this way.

> ENVIRONMENTAL EDUCATION is aimed at producing a citizenry that is *knowledgeable* concerning the biophysical environment and its associated problems, aware of *how* to help solve these problems, and *motivated* to work toward their solution.

The major objectives of environmental education are to help individuals acquire:

1. A clear understanding that man is an inseparable part of a system, consisting of *man, culture,* and the *biophysical environment,* and that man has the ability to alter the interrelationships of this system.

The principal feature of the philosophy of environmental education is that man is an integral part of a system from which he cannot be separated. Specifically, this system consists of three components, man, culture, and the biophysical environment. *Culture,* in this context, incorporates organizational strategies, technological processes, and social arrangements (political, legal, managerial, educational, etc.) through which man interacts with the biophysical environment. The *biophysical environment* designates both the natural and man-made components of the environment.

The fundamental relationship between the integral parts of the system is man's interaction through culture on the biophysical environment to produce or obtain the goods and services that he needs.

Within the system, man has the ability either to strengthen, weaken, or maintain the interrelationships between the system's major components. The ultimate goal of environmental education is the development and maintenance of a high quality system in which man interacts through culture on the biophysical environment to advance human welfare.

2. A broad understanding of the biophysical environment, both natural *and* man-made, and its role in contemporary society.

The existence of any civilization is dependent upon man's use of natural resources. Resources are defined as those parts of the biophysical environment which are appraised by man as being immediately or potentially useful to him.

A basic understanding of natural resources ideally includes their characteristics, distribution, status, interrelationships, and their present and potential uses. Natural resources serve man in many ways, whether in a relatively undisturbed

condition or in the highly altered utilitarian forms of the man-made biophysical environment. A strong understanding of how these resources are used requires knowledge of the social, political, economic, technological processes, institutional arrangements, and aesthetic considerations which govern their utilization.

The man-made component of the biophysical environment results from man's use of natural resources. An understanding of this aspect is also essential: it should ideally include familiarity with urban and rural design, including transportation systems, spatial patterns of development, and aesthetic qualities which have a major impact on the functioning of society. Fundamental to these understandings should be the realization that the development of the man-made environment should strive for a high quality system which improves human welfare in relation to the natural environment.

3. A fundamental understanding of the *biophysical environmental problems* confronting man, *how* these problems can be solved, and the *responsibility* of citizens and government to work toward their solution.

Biophysical environmental problems result from the interactions between man, culture and the biophysical environment. Pollution, the inefficient utilization and management of natural resources, the indiscriminate use of pesticides, urban blight, and transportation congestion are just a few biophysical environmental problems. These problems, caused by a complex set of biological, physical and social factors, affect the total environmental system.

Citizens need to understand *how* to work toward solutions of biophysical environmental problems through laws, public policies, planning, resource management, research, technological developments, and institutional arrangements.

Citizens should realize that the *responsibility* for solutions to these problems belongs to them and the governments which represent them.

4. Attitudes of concern for the quality of the biophysical environment which will motivate citizens to participate in biophysical environmental problem-solving.

The word "attitude" used in this context implies more than simply the knowledge of a body of factual information.

Instead, it implies a combination of factual knowledge and motivating emotional concern which result in a tendency to act. Further, it is understood that clusters of attitudes about similar environmental conditions will motivate individuals to express their attitudes.

Therefore, for environmental education to achieve its greatest impact, it must: 1) provide factual information which will lead to an understanding of the total biophysical environment; 2) develop a concern for environmental quality which will motivate citizens to work toward solutions to biophysical environmental problems; and 3) inform citizens as to how they can play an effective role in achieving the goals derived from their attitudes.

If an understanding of man's environment is indeed essential to the educational development of our youth, our schools must give appropriate priority to environmental education and designate an individual or committee to appraise the total instructional program of the school system and to make recommendations.

Some school systems have employed Environmental Education Consultants to help develop instructional programs aimed at transmitting and inculcating into the minds of the youth they serve a fuller understanding of man's environment and the role of the citizen in helping to solve environmental problems. Other school systems have improved their instructional programs in environmental education through the work of a committee composed of administrators and teachers representing various disciplines and levels of education. Regardless of who leads the effort, attention must be directed to the total school curriculum, to class activities, and to the *inservice teacher training program.* These should not be thought of as separate entities but as vital components of a total environmental education program which involves the entire staff.

Some points to consider in relation to the curriculum are:

1. Identify "understandings" which are minimal prerequisites for informed citizen action regarding natural resources and the environment of urban regions.

2. Survey the total existing curriculum and determine the most effective way of integrating the understandings into the total school curriculum (K-12) in a manner that will provide the logical continuity and progression.

3. Give the learner an opportunity to study the community environment under natural conditions. This will provide certain learning experiences that can not be duplicated with the school building.

4. Stress attitudes and not vocational skills. The most important conservation impact that our urban youth will have upon the environment will be through their action as community citizens.

5. Emphasize local environmental problems but do not neglect state, national, or international environmental problems.

6. Give the learner the opportunity to play an active role in the learning process. The learner develops attitudes through personal experiences and thinking and not through the presentation of predigested conclusions.

7. Provide a comprehensive inservice training program which operates throughout the school year and is directed at helping teachers increase their understandings, interest, awareness, and teaching skills regarding the environment.

What I would like to do in the next twenty minutes is to use some slides to focus on the concept of understanding more fully the community environment.

We have many outstanding natural history centers and nature centers that children can visit and obtain information about their natural environment. But how does a child obtain information on the community environment? I would like to suggest that we establish community environmental interpretive centers directed

at helping both youth and adults to obtain a fuller understanding of their community biophysical environment and its associated problems.

A community interpretive center could use the community as its laboratory. The interpretive center could sponsor field trips for youth to community facilities, like those listed below, and raise some of the following questions:

1. Visit to the community water treatment plant to determine the following information:
   a. What is the source of the community drinking supply?
   b. What chemicals are used to treat the water?
   c. Is fluoride added to city water to reduce tooth decay? If yes, for how long? If no, has it been proposed?
   d. Has the treatment plant been enlarged in recent years? If yes, how were the funds appropriated? Have there been bans on water usage in recent years?
2. Visit to a local community park that is bordering a water area and obtain the following information:
   a. Is there good access to the park? If no, is it possible to improve it?
   b. Is there swimming available at the park? If no, why not?
   c. Is the water dirty? If yes, where does the dirt come from?
   d. Does your community have enough parks located around water areas? If no, is there land bordering water in your community that could be used for a park?
   e. What are the recreational uses of water in your community?
3. Visit to a local industrial plant in your community and find out the following information:
   a. What is its source of water? Is the source adequate?
   b. If the industrial plant had to move, would water supply be important in the selection of its new location?
   c. Does the industry have a waste disposal plant? Has the industry solved its waste disposal problem?
4. Visit to the community sewage treatment plant to determine:
   a. Does your community separate sanitary wastes from storm runoff?
   b. What type of sewage treatment is employed by the plant? Is the type of treatment considered adequate for the present time and for the next 20 years?
   c. How is the sewage treatment plant financed? Is it self-supported?
   d. Does the sewage treatment plant receive waste from local industrial plants? If yes, are any of these wastes unusually difficult to treat?
   e. Is the plant effluent (treated sewage) discharged into a stream or a lake? Is the effluent chlorinated to protect downstream recreational users? What downstream communities use the water for municipal purposes?

If we are to bring urbanized man to a fuller understanding of his environment, we must embark on a comprehensive environmental education program. The program should be aimed at producing a citizenry that is knowledgeable concerning the biophysical environment and its associated problems, aware of how to help solve these problems, and motivated to work toward their solutions.

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Using Environmental Conditions for Language Acquisition

Thomas M. Stephens

We have achieved superiority among other primates because of our advancing level of communicative skills—speaking, reading, and writing (Dobzhansky, 1962). The acquisition of these skills results from our ability to use symbol systems such as alphabets, numerals and other symbol forms. Consequently, major portions of schooling are comprised of acquiring, manipulating, and using various kinds of symbols.

Those students who master the use of these symbols are viewed as high achievers, while individuals who have difficulty in using symbols are considered to be poor achievers. Many migrant children apparently have trouble with our systems of communicating and thus tend to demonstrate moderate to poor academic achievement. Reasons for their difficulty in acquiring communicative skills are widely recognized.

These include:

1. poor health,
2. lack of opportunities,
3. unsystematic schooling, and
4. ineffective teaching.

Language skills of migrant children can be improved through more effective use of environmental conditions, a natural way to acquire language skills.

CONDITIONS INFLUENCING LEARNING

Jersild (1955) has indicated that:

> Each child brings to his present state the child he once was, the child he now is and the child he is striving to be.

His statement recognizes one set of environmental conditions that affect learning, factors that are *internal* to the student. Internal conditions that influence learning include: a) the biological make-up of the child, and b) effects of his past experiences.

External Conditions

Another set of conditions are those *external* to the learner. These include: a) teachers' attitudes toward students, b) teachers' instructional skills, and c) stimuli available for responding behavior.

As teachers, we can affect more change by focusing on those conditions that are external to the child. Although, recognition of internal factors and awareness of deficits permit teachers to improve the learning opportunities for migrant children. For example, squinting should serve as a basis for referring children for medical services. Just as apparent hunger and poor nutrition should cause other kinds of services to be provided.

TEACHER ATTITUDES

Teachers and other school personnel can respond more directly to external conditions. Teachers' attitudes toward migrant children are fundamental to effecting change. Teachers who are tough, who teach subject matter instead of students, who are overly demanding, who project their own sense of inadequacies on students, and who ignore children's needs for recognition and affection tend to destroy student interest in schooling. They convey to students the false notion that they are incapable of learning. But teachers who are warm, who view migrant children as worth helping, as capable of learning, as having handicaps that can be overcome will convey to students that school has something of value for them.

One major handicap many culturally deprived children have is a feeling of rejection by middle-class peers and teachers. When children have experienced repeated rejection, they came to school with poor opinions of their worth.

Coombs (1962) has suggested that how children perceive themselves determines to some degree what they will achieve. It is his belief that those who view themselves as unable to learn will have more difficulty learning than will children who recognize their abilities. Teachers of migrant children have responsibilities for building self-concepts and helping them to recognize that they can achieve a measure of success in school. Positive attitudes among teachers as well as students will contribute to school achievement.

IMPROVING ATTITUDES

Many migrant children come to school with negative attitudes and present behavioral problems. Values derived from home tell these students that education is alien to their way of life, that authority as represented by the school is unfair and favors more affluent citizens. In short, the strange feelings that are associated with differences tend to make migrant children feel uneasy.

Behavioral and learning problems are also related, in part, to a conflict in value systems. These children have learned that one must be aggressive, harsh, and ready to fight in order to survive. These same behaviors when displayed in school are greeted with punishment. The children become confused; they are punished at school for behavior that is acceptable at home. Thus, children interpret rejection of their behavior as also a rejection of themselves. Consequently, students soon become alienated from school and reject what teachers value.

Teachers who gain rapport with students can change negative attitudes to positive ones. Sometimes this is accomplished by being firm, fair, friendly, and understanding. Understanding teachers let students know they understand by being sensitive to what is said and by reflecting students' feelings.

When a student says "no, I ain't going to," do you threaten him? Or, do you respond by saying, "John, you don't want to do this assignment?" If you reflect his feelings first, you may be able to discuss the problem with him. But if you react defensively, he will probably become more negative.

Understanding is fundamental; it is the first step. But alone, understanding is insufficient. Effective teaching skills are essential if changes in performance are to occur.

INSTRUCTIONAL SKILLS

Educators believe that effective teaching results in positive changes in human behavior more rapidly than if learning is left to chance interactions with students' environments. Thus, while experience alone results in learning, children may learn responses that are incorrect or that are harmful to themselves and to others. Consequently, contrived experiences are arranged in order to effect positive growth in our young. These experiences are presented in institutions that we have named "schools."

Successful teaching involves manipulating three variables each of which is essential to teaching-learning situations. These are: 1) instructional media; 2) physical environment; and 3) learners.

The first two variables have long been the concern of educators. But the third variable, manipulating learners is less often discussed, although it is daily a concern of classroom teachers.

Direct manipulation of human behavior takes place as a result of rewarding responses. All reactions of children beyond the most basic visceral ones have been learned. Children learn to like or dislike certain activities in school; they learn styles of behavior; they learn to respond to a given stimulus in a given fashion; and they learn that the sum of 2 + 2 is 4. In short, children behave as they do because of how they have learned to respond to certain events and stimuli.

Children also learn to associate pleasant or unpleasant feelings with specific school activities. Thus, the child who is ridiculed because of his poor achievement in a given subject can soon learn to associate feelings of degradation with that subject. He may further generalize such unhappy experiences to other school-related activities.

So it is that we teach children to behave as they do, even though instruction that results in certain behaviors is inadvertent.

TEACHING LANGUAGE SKILLS

Language is learned through two major senses: auditory and visual. Although, it is possible to reinforce language olfactorilly and kinesthetically (Stephens, in press). When hearing facility is intact, children have the capacity to assimilate sounds and thus can learn to imitate those symbols. Visual stimuli provide children with objects to which auditory labels can be attached.

Vocabulary Development

Language patterns used to communicate within sub-cultures have a greater influence on children than do language models and academic instruction that occur in school. Consequently, the effects of out of school influences on language development of many culturally different children is more powerful than schooling.

Teachers should learn those language labels used by such children and use these as starting points when talking to these children. When formal instruction in reading begins, such approaches as described by Lee and Allen (1963) in Learning to Read Through Experience will prove more effective than most commercially published beginning reading materials.

Children from culturally deprived homes have a limited vocabulary. Not only do they use few words but they often fail to recognize different meanings for one word. Culturally deprived students need to be taught flexible vocabulary. Rich experiences should be made available to these children and then related to experience charts and to creative writing.

School programs at all levels should emphasize integrating experiences with classroom instruction. Frequent excursions should be made into the natural environment of the outdoors. Here migrant children may feel more secure and it is here that teachers should *listen* as well as *speak*.

If teachers listen during field trips, they will hear the language labels used by children in reference to their environment. Teachers may find that what they have made reference to in class was not known to migrant children because other labels are used to designate these features in the child's environment.

Qualitative experiences can be provided by controlling ingredients of each experience. For example, a trip to the zoo alone is insufficient as a powerful learning experience. It should be preceded by extensive instruction and group preparation in which students learn what to look for and how to recognize various animals. Audio-visual equipment provide great instructional aid. Following a discussion, students might hear a recording of animal sounds. Or movies dealing with natural habitat of animals could be shown.

Experience stories can be dictated and written by children describing what they hope to see. Thus, the trip to the zoo will be based on a prior experience.

Following field trips, teachers should insure that transfer of learning will occur by planning follow-up activities and experience charts to further develop vocabulary and thinking. Children who have had such experiences will be better able to read when confronted with related reading material.

Teachers should also build into their instructional repertoires ways to improve retention. Concrete momentoes of activities throughout the school year will serve as reminders to children. When students see the mural that they helped make in connection with a field trip, it will trigger visual images of the experience. Reading relies heavily on visual imagery. They will recall language patterns used in relation to various activities. From these seeds facility in language grows.

REWARDING LEARNING

A fundamental principle of learning is that *responses that result in satisfaction to the learner are learned.* Children need to know when they are correct or when their responses approximate desired ones. Rather than indicating to students who frequently emit incorrect responses their failures, teachers should focus on those correct responses.

Let us say that Howard incorrectly spells five out of ten words. If his teacher wishes to encourage Howard in his efforts, those correctly spelled words should be marked and the number *correct* should be noted on his paper. By behaving in this way, Howard's teacher will have:

a) encouraged him to persist in learning to spell words, and

b) would have provided him with a positive feeling toward the activity and probably schooling in general.

Teachers should provide clues in order to guarantee success prior to student responses. If a student, for example, knows that Abraham Lincoln was president of our country during the Civil War but does not know that he was our 16th president, his teacher should ask the question:

"Our 16th president was president during the Civil War; who was he?"

DEVELOP ATTENDING BEHAVIOR

Attention to relevant stimuli is one prerequisite to learning. In fact, one cannot learn without attending. Teachers can aid students to develop better attending behavior by giving careful directions and by providing short segments of instruction.

Teachers of culturally deprived children should be sensitive to the ways they give directions. Often these children are unaccustomed to structured settings; many have spent their days unattended. Few rules of conduct have been explained to them. Teachers should try to devise rules in cooperation with the group. Complicated rules should be avoided. The rules should be discussed frequently not only when misbehavior has occurred.

These children will often find detailed verbal directions confusing. A good practice is to break assignments into small segments, reducing complicated directions.

Teachers should plan in advance when dealing with children who exhibit problems of attention. By announcing the child's name in advance of asking a question, the teacher will sound a warning for the student to pay attention.

Providing interesting activities for learning is an effective way to gain student attention. Tasks that students can perform with a great deal of success are always preferred to those that provide limited success.

SUMMARY

Teachers have a degree of control over many external conditions that can result in improved learning. Because language acquisition requires using symbols, migrant children often present difficulty in mastery of language.

Teachers who present positive attitudes towards students will encourage them to accept schooling and its concomitant values. Vocabulary is developed through a process of assigning language labels to objects initially and gradually moving toward abstractions. Teachers can contribute to vocabulary development by using experiences judiciously in conjunction with academic activities.

Learning is reinforced by rewarding desired responses and attempts.

Attending behavior is fundamental to learning. It can be developed through systematic procedures that give students clues in responding and also by shortening periods for attending.

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CARL S. JOHNSON

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Instructional Materials for Outdoor Education

Carl S. Johnson

When you understand all about the sun
and all about the atmosphere
and all about the rotation of the earth,
you may still miss the radiance of the sunset.
There is no substitute for the direct perception . . .
of a thing in its actuality.

— Alfred North Whitehead

We are too exclusively bookish
in our scholastic routine . . . .
In the Garden of Eden Adam saw the animals
before he named them;
in the traditional system, children named the
animals before they saw them.

— Alfred North Whitehead

Those statements of the eminent educator Whitehead express my sentiments about the place of outdoor education in the educational process. They say the same but say it a little more subtly than did Louis Agassiz when he said, "Study nature, not books."

Now neither of those men would say that we should not use books. They do say that books are not a substitute for reality. They do imply that books, the printed word, becomes meaningful in terms of our experiences with actualities. This agrees with what I believe is the substance of educational psychology.

But I have the assignment for this conference of discussing "instructional materials" for outdoor education. Conditioned as we all are to secondary or even tertiary, etc. materials of instruction we will all tend to now ask: "What has been written?" and to further ask, "What supplementary and/or audio visual materials have been prepared to help teach . . . ?"

OK? So we have asked those questions.

ANSWER: Lots of things have been written about outdoor education. Many things have been written for outdoor education. For illustrative examples consult the library and reference center in this building. The Outdoor Education Center is just bound to, yea, in our culture obligated to, stock printed materials for outdoor education.

Some of these may be quite helpful. Some may be harmful. Most probably fall in the indifferent in between: a safe generalization for most instructional materials. However, most of us are so conditioned for the values of printed materials that it is almost certain some of you cannot conceive of any printed materials about or for outdoor education being harmful. I submit that if any printed materials stand in the way of observation, discovery, thinking, such material is harmful to learning and certainly harmful to "outdoor education." Let me share with you some of the things about *free* and *lowcost* printed materials for conservation education that we discovered in a three-year study which collected and examined over 8,000 different pieces of such materials.

The study from which I report tried to analyze factors which control the effectiveness of these materials. These factors include distribution systems as well as qualities and quantities of the materials. We wanted to find out ways for making the materials more effective.

We asked 2,408 potential sources for copies of "free and inexpensive printed conservation materials prepared for or sent to schools." Our attention was focused on stuff prepared for or given to schools. We later visited over 100 of the producers of such materials to determine the amount and nature of materials we might have received had we thus solicited all sources. We deliberately did not define conservation. We wanted to see what we would get without setting limits. We did get quite a variety.

We received 8,033 different titles from 755 producers. Producers below state level are not present in this count so, if these plus the state and national level producers we may have missed are added, one can say there are at least 1,000 different producers of free and inexpensive printed materials related to natural resources.

There Are Over 20,000 Titles Available

We collected 8,033 titles in one year, 1963-64. The eight thousand titles are sorted into five major categories, sorting first on basis of the audience addressed:

Materials addressed to teachers	636
Materials addressed to students	822
Addressed to "general public"	4,227
Addressed to managers & technicians	1,789
Publications lists, unsorted	559
	8,033

We made personal visits to over 100 producers in eleven states and Washington, D.C. From these we had received 1,305 pieces by mail; we received 4,436 by visitations. Our data supports a minimum estimate of 20,000 titles related to the management of natural resources on distribution shelves at any given time. Most of it is for free distribution.

Most of the Collected Materials Are for the General Public

Most of the material we received is addressed to the general public. Only one-fifth of our collection can be said to have been prepared for conservation education in schools; this is about evenly divided between materials for teachers and materials addressed to students. Six times as many pieces are addressed to the general public; most materials are "shot-guns" instead of "rifles," that is, they attempt to address everybody.

Our request for materials for schools was a selective factor causing the elimination of much technical material. Perusals of publications lists leads to the inference that at least two-thirds of all free and inexpensive printed material related to natural resources is technical, that is, is addressed to managers, technicians, scientists, etc.

Materials for the general public will constitute a large portion of the material given to schools. That's what happened for us. But materials prepared for schools will constitute no more than one-tenth of all titles produced. We hypothesize that the total of all free and inexpensive printed materials related to natural resources is divided about as follows:

Technical	65 percent
General public	25 percent
Students & youth	6 percent
Teachers & leaders	4 percent

Quantities Are Seldom Adequate

A major reason for the production of free printed materials is to create goodwill for the producer. One might therefore infer that the materials will be of high quality and will have been published in large numbers. Neither of these inferences can be supported. Only three percent of all titles in our collection have been produced in quantities of one million or more. National Dairy Council material and the comic-book formats produced by the Soil Conservation Society dominate the list of million-plus titles.

Audiences are large in our country now and, says both advertising and our data, it takes a multiple of an audience to "sature" it. Quantities of free printed materials on conservation very, very seldom do this. Larger quantities of fewer titles seems a warranted suggestion.

What Do Free Materials Cost?

We know that free materials cost money and time and talents to produce. We have no objective measure of time and talents but we did measure cost of printing. Most of these materials have a low cost per copy. The median cost is four cents per copy. The mean cost is 12.7¢ per copy. Materials for teachers are most expensive and that for the general public is the cheapest. Three-fifths of the material in our collection cost less than six cents per copy. One percent cost one dollar or more; most of those titles are for teachers.

The aggregate annual expenditure for printing free and inexpensive materials related to natural resources is somewhere around 100 million dollars. At least 6,000 titles are produced each year. This figure times mean cost per copy times mean copies per title yields an estimate of $131,000,000. What are we getting from that expenditure?

Free Materials Are Ephemeral

Thirty percent of all the material we received is undated. State-level conservation agencies account for most of the undated state-level materials.

Materials dealing with wildlife are more often undated that are materials dealing with soil, water, or minerals. Only 10.7 percent of our technical materials is undated but 38.1 percent of material for students carries no publication date.

Several producers told us that materials will be usable longer if not dated, that dating hastens obsolescence. Educators almost invariably, on the other hand, prefer that printed materials carry a date of publication. It would seem that for school use dating assures a longer period of usefulness because the user does not then have to wonder about the time factor.

Undated materials are only slightly different from dated ones in durability. Their initial depletion is more rapid; some are "throw aways." Shelf life of undated materials begins to gain over that for dated materials after about ten years.

Most free printed materials are ephemeral; supplies are exhausted before they are outdated. In a culture that so commonly asks, "When was it published?" dating free materials seems preferable.

What Is in the Materials?

You wonder what is said about the resource discussed. We did too. One worker read about 2,000 pieces. She tallied the topics treated. Here is her summary:

> Erosion is a topic in more than half of student materials on soils. Land use outranks erosion slightly in public materials. Soils mapping and land judging is next in frequency but most pieces thereon are addressed to teachers or students of vocational agriculture.
>
> Pollution and uses of water were the prevalent topics in materials on water. Again, as with soils, management receives less attention than do uses, needs, and problems. Drought is, however, rarely discussed and pollution is treated two to six times as often as are floods.
>
> Petroleum and coal, much more on the former, were topics in 40 percent of all minerals materials for students. The commonest topic in minerals materials is stratigraphy and/or maps of bedrock. Identification of rocks and minerals is a topic in 25 percent of student and public materials. Fossils get almost as much attention. How to make minerals last longer is absent from student materials and rare in teacher materials; it is a topic in 29 percent of public materials. One can say that identification and location are treated; conservation is not.
>
> Plant and animal materials also emphasize identification. Agricultural plants are a topic of only one percent of student materials, 13 percent of teacher and public materials. Trees and/or forests were the topics prevailing in 77, 70, and 75 percent of student, teacher, and public materials respectively. The commonest problem mentioned is fire. The commonest management topic is how to plant trees.
>
> Domestic animals get little attention in animal-resource materials given to schools. Were it not for the National Dairy Council, our collection would have little to say about any animals other than those called "wildlife." Wildlife, judging by the content of free materials thereon, is almost exclusively vertebrates. Insects are mentioned in only four percent of our collection of materials related to animals. *Once again identification gets most attention. Most of the material we received on insects tells how to make a collection. There is little on management.*

There Is Little for Social Studies

Each of the 1,541 pieces in the analyses sample was evaluated by three sets of judges, three in each set. One set was conservation specialists; another was professional educators other than classroom teachers; the third set was composed of an elementary teacher, a secondary science teacher, and a secondary social studies teacher. This set was judging the use teachers in each of these areas might make of what any other judges had decided. It was discovered that conservationists were not good predictors of teacher rating of these materials. The teachers reported that:

1. Little of the material addressed to students is well adapted to both curriculum and

student maturity, and they were judging from "normal" students.

2. Very few materials are prepared for use in the social studies; most of the material is for science or assumes that science is the subject area in which conservation is taught.
3. Content depth is low in most materials. They add little to concept and information development beyond that now available in commercial materials, i.e. the textbooks, supplementary readers, ready references, etc.
4. There is very little for students in elementary grades, almost nothing for primary grades.

A few industrial associations are the principal producers of free materials directed to elementary grades. These producers do employ specialists in elementary education in the production of materials for schools.

What Will Increase Teacher Use of Materials:

Appearance is more important than quality in gaining teacher acceptance of materials. Free materials must compete with good looking commercial materials; being available "free" is not the advantage it once may have been, in fact, it may even be disadvantageous.

Materials for student use will win over materials addressed to teachers. Teachers welcome things that help them in working with students. They resist things which seem to add to what they must teach; they welcome things which help teach that which they feel they must teach. Keep this in mind while remembering that there is little conservation material for elementary grades or for secondary social studies; supply welcomed helps for the less saturated areas of the curriculum.

For school materials we must abandon the idea that materials written for adults will be suitable for nearly the whole range of grade levels. Both vocabulary and concept level need be better fitted to more specific levels of that tremendous K-12 range.

The cooperation of several producers to share costs and talents could produce more copies of better materials. Certainly more copies are needed, not more titles. Some industrial associations have demonstrated both the method and its effectiveness.

Recommendations for Teachers Seeking Materials for Outdoor Education

Having spent most of my alloted time telling you things wrong with free printed materials, you may well wonder if we have any positive recommendations. We do, but none of these are really new to you. I present them briefly with little explanation or defense.

First of all, use the outdoors. Observe, wonder, discover, explore, exclaim. Learn by seeing rather than by reading that there are little trees as well as middle-sized and bigger ones. Observe that there are many, many plants other than trees. See that domesticated plants are at least as important to us as are wild ones. Observe that they too are affected by their environments, that some do grow more vigorously than do others. Discover that there are many more seeds than plants and that the natural order permits or can permit only a few among them to grow up.

Don't just look up answers on printed pages. Better to develop some of the questions by observation of actualities before seeking the overwhelming accumulation of knowledge that is the result of the observations of actuality by others. Thus develop a motivation for using the shortcut of reading what others have learned.

Second, do not fret about providing *the name* for things in the out of doors. One does not need a calibrated standardized device to measure and to compare distance, heighth, and area. Let students discover how and why units of measurement have developed, e.g. cubit, span, hand, pace. Then they may want to read about and will more probably understand that they do read about measurement. This is the approach your text materials do suggest! For another example, consider how many shades of green there are. You could have students read about it but one can readily see that there are many.

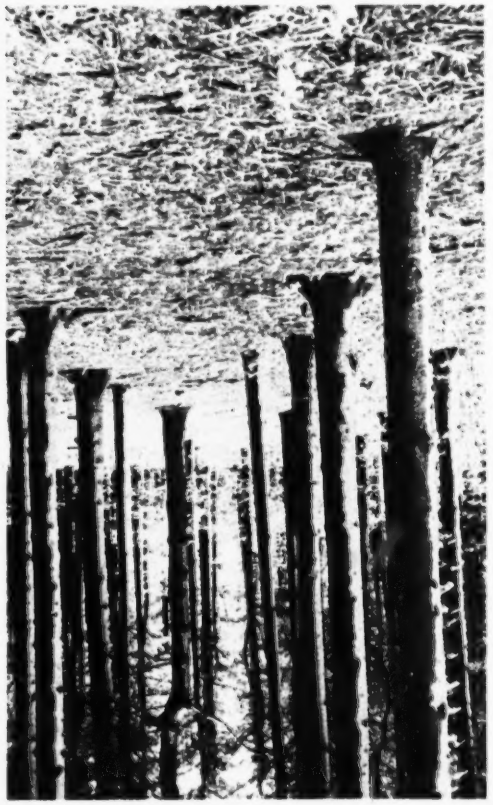
Third, or perhaps first, depend on curiosity and our cultural conditioning to name things and to find out about named things to provide an adequate stimulus for finding out more about some things discovered. Is it not the seeing of lightning and the hearing of thunder that has caused man to ask, "What is it and how does one cause the other?" Would you really expect a blind and deaf child to ever ask about thunder and lightning? In our dependence on printed materials before or as a substitute for observations of actualities are we not trying to teach "heard" and "seen" to students who have never done so?

Fourth, do be aware that education is considerably more than science education and that outdoor education also includes more than scientific observations, experiments, and conclusions. If we must compartmentalize education into categories such as art, music, social studies, mathematics, language arts, science, etc., let us at least admit that all these categories of knowledge exist in the world in which we do live and that some arts and language arts learnings are better accomplished out of doors than in the traditional classroom.

Fifth, *buy* printed instructional materials. Do not expect much for nothing. Do not depend or even hope that free printed materials will be of much value as instructional materials. Put more reliance on the "commercial" materials; they are at the least subject to some quality control through the market system.

Sixth, look over the book shelves here at the Outdoor Education Center for some pretty clear evidence as to which kinds of books are valued by curious students. They are the well-thumbed, heavily-used items. Note that children have heavily used such things as the Eschmeyer series (*Bobby Bluegill, Tommy Trout,* etc.), the Bertha Morris Parker books, the *Life* series, the Golden Nature Series. Note that children have not used the "technically" better ones such as Britton & Brown or the Putnam Field Guides. Note that children prefer the simpler, the prettier, and the more animated ones.

So, finally, start with the simple. Select simple discovery materials over the "tell 'em all about it" stuff. Note, for instance, how very heavily used are the Nature Guild's *Tree Finders.* Start at that level with printed instructional materials.



MARY HARBAGE

Wright State University

Outdoor Education and the Language Arts

Mary Harbage

I look up. It is eight o'clock; there is a roaring in the corridors and a sudden flood of children into the classroom. The small, brown boy who approaches my desk eyes me eagerly.

"Yes, I'm the regular teacher, and I hope to stay for the rest of the year. You've had three teachers already, haven't you?"

"Yes, Mees, dey all leavin' because we fightin'. For you we not goin' to fight." He flings himself into a seat and sits at attention . . .

They have merely been exposed to third grade work and found wanting. I have been handed a stack of third grade texts, marked at the place where the last teacher left off, and told: "Do the best you can – this is the worst bunch in the school." . . .

The children love to go to the library. They come back hugging books with wonderful pictures and begging, "Here, Mees, you read dees one now." They thrust their books upon me, eager to know all that the pictures mean.

Danielito waves a book, his eyes sparkling: "Look, Mees, one Wanderful Weezard of Oz! Eet have a weetch. Maybe you know eet?"

"Yes, I saw the movie about the Wizard of Oz when I was little."

Joe Salinas chimes in eagerly: "Oh, I know eet too! I see eet too! I weetch you a meery Chreestmas!"

"Well, that's something else; that's wish."

"No, Mees! I weetch you a merry Chreestmas, dat's what eet say."

So it goes. When I ask them what jam is, someone insists it is where big boys play basketball. The word "watch" is the same as "wash," and "sad" and "sat" are alike. One poem has the line, "Especially on Christmas week, temptation is so great to peek." I notice laughter every time we say this line. I wonder if it could be one of the innumerable "bad words" whose innocent use always brings laughter. Finally I ask, and Javier chortles, "Oh, Mees, peek tomatoes!"

What a "great blooming, buzzing confusion" the English language is to these kids! If they can't hear it and can't say it, how do we expect them to read it and write it? . . .

It is a shock to realize that after all the traveling they've done, these kids have no idea where they are and where they've been; no concept of distance, direction, or the relation of one place to another. Now we are working with a large wall map which I brought from home. They love it. It doesn't require much reading, and they are quite sharp about remembering places once they are pointed out. Some do much better than others, of course, but at least no one thinks that Africa is in Illinois any more!

Andres says gleefully: "What ees da beegest pencil?" No one knows. "Pennsylvania!" Everyone loves this joke, because by now we know where Pennsylvania is.

WE MOVIN' ALL DA TIME

The day we change rooms is one to remember. Our room is now very hot and there is a shady one standing vacant down the hall. So I announce, "Kids, we are moving out." They snap to attention like hounds that have picked up a scent. "Not to Illinois, not in a car or truck; we're moving down the hall to that empty room, just as quickly and quietly as we can."

It is like throwing a switch. One moment all is intense listening. The next moment, a whirlwind has struck. Maps fall from the walls, books disappear from the shelves, my desk drawers are seen departing out the door; all I can do is run after them.

Within the hour every bit of equipment is in place in the new room; the maps and cards and decorations are on the walls, the kids are erect and proud in their seats. I look over the neat rows and ask, "Where on earth did you learn to work like that?" Rana, sweat still dripping from his face, answers joyfully, "Oh, Mees, dat how we know to work. We movin' all da time." Yes, Rana, moving, and working in the fields, working as I have never worked. Too bad we don't have achievement tests for that. . . .

* * * * *

Mario is fourteen. He is well built and does a man's work and receives a man's wages. He has been a cotton picker all his life. He cannot read because he has never been in school long enough to learn. I see him before the class, his big hands gripping the elementary reader with painful intensity. His brow is furrowed; he is working hard. "See Puff run. Funny, funny Puff" . . .

I think how seldom he smiles. He struggles on with Puff and Dick and Jane. He is a good boy, never a discipline problem. I try to imagine what fires of resentment must burn behind the quiet face. Dear God, send us books for boys like Mario! (When our reader about the frontiersman finally arrives, Mario has already moved on.) . . .

The achievement tests have been taken and sent in. It is a farce. Most of my kids will remain in third grade – why push them into fourth grade readers and workbooks? It is too easy for teachers to hate children who can't keep up with the class. I wish they could be in an ungraded room with no failure threat hanging over their heads.

* * * * *

Of all the teachers' meetings we are asked to attend, one is eminently worthwhile. The chief speaker is a Negro educator from Chicago. He begins his address in Persian, switches to Oxford English, and finally lapses into Texas talk. The teachers get the message. He points out the simple fact that Latin kids do not learn from us primarily because we are not speaking their language.

After the meeting, I seek him out and begin to unburden my soul. He soon interrupts me: "Shut your door, throw the damn textbooks out, and teach those kids what you think they need to know." I never feel completely hopeless after this day.

* * * * *

Now for living and learning in the out-of-doors.

Some of us are fortunate, we have known early in life what the out-of-doors has to offer and so knowing, accept its many gifts as our rightful heritage. Others, who are also lucky, may find its many satisfactions later; but for a few, it can be a place of fear and terror rather than an environment in which to find inspiration, relaxation, escape, and serenity; offering an endless array of learnings as one explores and discovers, probes and collects, organizes and reorganizes, classifies and summarizes.

As some of you know, growing up on a Madison County farm was probably one of the two greatest gifts of my childhood. There were trees and hills, an orchard and a woods, two brooks and a sizable creek, a pond and an ancient mill race which had evolved into a swampy bog. Insects galore were for catching or escaping. On mid-summer nights fireflies were captured for a brief span of time with a Mason jar. Dragonflies darted back and forth above the pond, butterflies decorated already beautiful flowers, dandelions went from gold to fuzzy gray, sweet clover was braided into garlands and crowns. You knew exactly where to go to find the first violets, the mayapples, and golden buttercups, the latter usually linked with wet feet. Frogs plopped into the pond, fish swam lazily or darted swiftly out of view. The most soothing of all lullabies was the sound of spring peepers chorusing in the creek bottom or an overflowing brook rushing over stones and rocks on its hurried way.

The animals, in spite of all efforts to have them come at my call, remained in three classifications: tamed, semi-tamed and seemingly untamable. There were stupid chickens, noisy ducklings, squirrels whose pointy noses earned one after another the name of Richeleu, nesting and south or northward-bound birds, a stubborn pony, inevitable orphan lambs, grunty little fat pigs, wobbly calves, occasionally a beautiful foal, a clutter of cats, and always a companion dog; the whole series well loved and completely dependable from Old Fred who helped me learn to walk to the ever-present Rob.

From early spring through fall it was an outdoor world. Toys, books, magazines and a great variety of things – mostly filched from the kitchen – moved in and out of the house with the changing weather or in answer to the complaint, "Did anyone take the dipper?"

This responsive outdoor world was a perfect place for learning and its teachings were fully used for I had all other essentials. There were hours and hours of uncommitted, uncluttered, unstructured, free-flowing time. There was time to dream, to mull things over, to look again, to get excited about the next emerging project, to explore, to give and take. There was even time to blissfully do nothing as I watched the changing patterns of the willow branches against the sky or half sang to the accompaniment of the wind rustling through the pine trees. Many a hot summer night was begun lying flat on my back on an old comfort right in the middle of the croquet court "pulling the stars down out of the sky" for as twilight faded, stars, constellations, and perhaps even a planet would emerge from the gradually enveloping darkness.

Not all hours were play ones; time was not always your own. There was no escape from responsibilities and little inclination to do so. No one in a farm family needed to be reminded that the hay must get into the mow within the span of a few summer days – there are immutable laws of nature. Even the youngest kept a wary eye out for storm clouds in the sky. Threshing time was more exciting and my job as water boy was not only necessary, it was crucially important. Even Beauty, the stubborn pony, seemed to sense this, for only at this one time of the year did she come, stand still, allow herself to be hitched to the pony cart, and obey each guiding signal.

After the kegs and jugs had been packed aboard, she started willingly on our circle tour – the men at each wagon in the fields, those met on the way, the crew at the threshing machine, and then to the pump to re-stock, get a piece to eat, and start again.

My coming meant for these men, a brief respite from back-breaking toil under the hot summer sun. All work stopped as I pulled Beauty up beside a wagon. Off came straw hats. Sweaty faces were wiped with bright bandanas. In one sure movement a jug was tossed to the man on top of the wagon. His partner on the ground took another, and hooking a thumb and finger in the handle, tossed the jug to his shoulder, tilted it to an exact angle and the water gargled down his throat.

I was the messenger boy as well as the water one. Word would come from the grain elevator in the nearby town, "Speed it up. We're waiting," or "Slow down, the loads are backed up." Once a day there was a message from the head of the kitchen to the man in charge of threshing, from mother to father, "Food's ready, come in." As water boy I took my place and was served at the first table. As the crew moved from farm to farm through the neighborhood, I became a connoisseur of good cooking. Chicken and noodles, roast beef and roast pork, apple and cherry pie were dishes on which I expended satisfying hours of research.

Mid-afternoon there was a special trip. By then the enormous piles of dishes had been washed and stacked on the dining room table for tomorrow's use and mother had a bit of a breather in which to make favorite drinks. Half of the jugs were filled with sour-sweet lemonade. Into most of the rest went cool milk flavored with nutmeg, vanilla, and sugar. The last few were filled with clean, cool water. This was the longest trip of all. The men drank deeply, talked and joked a bit. Somehow the pace had eased. But, no matter how long the day, everyone kept going until the last wagon was on its way to the barn lot – at a fast clip if a storm was brewing.

Was it work or was it play? The two often merged as they should. On the hot sticky trips back and forth across the creek, I kept eyeing the water, with the big stepping stones making a kind of bridge between one side of the farm and the other. Wading across while leading the pony was cooling, but it didn't compare with taking a real dip. The creek was too shallow for swimming, just deep enough to paddle around in and get coolishly wet.

While mother and I were getting me cleaned up at the end of the day, a project requiring joint effort, I began to question her. Did she remember the big dam near Columbus? It held the water back. Why didn't it wash away? How was

it made? As usual, mother sought out information in books. The current encyclopedia had a section on dams and she found an article about beavers and their work. We engineered a Sunday picnic to the nearest dam and got father started talking about dam building in general.

My sister and I began to experiment. We made a pool two feet wide by putting a dam across the brook south of the house. With this experience in hand, or under water as it were, we moved north to a fairly swiftly running stream. On mother's advice we surveyed it from the culvert under the road to the creek, searching for natural helps. Half way down the hill, the stream changed course somewhat because of the roots of an old tree. These were incorporated into our construction. The dam was none too strong for the first rain washed it away. The next try was better and we advanced to a series of dams, rapids, and tinkling waterfalls. For several days we were side-tracked from our main objective, a dam across the creek, by making boats to shoot the new rapids.

Each time we looked at the creek late that summer, it seemed a little less wide, a little more manageable. And, after all, the stepping stones which had stayed firmly in place through spring floods and winter freezes could serve as the foundation. By conjuring up a vision of a deep swimming pool and perhaps even a diving board, we were able to enlist the help of young neighbors. Some pulled brush and branches to the bank. Others gathered rocks while the big boys took over the task of moving the larger stones into place.

When things went wrong a messenger was sent to the house to consult with mother, who by that time had collected a young library on dams and dam building. Advice and food were always forthcoming.

It was Bill who finally realized that on one side of the dam he was no longer working in water just up to his ankles, nor up to his knees — and in that second he gave up work for swimming. The dam was built.

The sequel to this came as father, on driving stock to the creek bottom, was faced with a veritable water meadow. He stamped back to the house, loudly proclaiming from some distance away what we were to do with that damn dam and that it was to be done before sundown. We did it. But the story had a happy ending. He remembered a deeper hole in the creek, hitched up a team of horses to a slip-scraper and he and the men deepened and widened the hole until we had a fine place to swim. You see, there was time — time for adults, time for children.

Summer followed summer; and looking back, I'm sure that more was learned in those long sunny hours out on the hills, in the creek, and roaming the woods than was gained once the school door closed us in.

What were the essential ingredients of this, an unfailing learning situation? How can we obtain these for more children? These are the important questions and it took me a number of years to finally find the answers and in time make them a part of my teaching. Because of my faith in outdoor living and learning I was usually able to escape the school room in late spring and move several groups of third graders into a room whose only boundaries were the imaginary lines between five trees. We left these unrestraining walls to explore the pond, search for trilobites caught for centuries in limestone, know first hand what erosion might mean as we watched it at work, gather lichen-covered rocks, mapped our area, got lost and found again in the woods, and stopped to thrill to a bird song. Most importantly we gained eyes that could really see, ears that did not miss many sounds, a sniff that could pick up strange and different scents, and a sense of touch that added infinite degrees of meaning to whatever was being explored.

Which is more fun, swinging on a strong vine in the woods or in a swing safely imbedded in concrete? Which helps your coordination better, walking a line on the gym floor or fording a stream on a log? We delighted in the answers to these questions. We even learned the names of a hundred fixed stars.

I wish that I had a map of Sugar Bush with me to show you. It was a rise of land which became, in the distance, a mountain crossed and recrossed by the stream and two roads which merged. At the top is Big Pond all set about with larches. They say that the bear lived close to Big Pond and came to it looking for berries. A bit below is a big flat resting stone. Further down is the Van's house and the caption "The deer often cross Big Pond Road. The Van's put out apples and clover for them." To the far left is the old log house the Van's grandparents built when they came as settlers. A foot bridge crosses the stream to a maple grove and the old barn where the swallows live. A Norway Spruce stands at the corner of the house at Sugar Bush; planted eighty-five years ago, and it is now sixty feet tall. It stands like a sentinel keeping watch up and down the valley. There are other trees all around; walnut, hickory nut, apple, peach, but mostly sugar maple. At one spot there is a dam across the stream, making Little Pond.

Sugar Bush was a perfect place for living and learning. I quote a bit from the introduction:

> You must watch carefully or you may miss it. Big Pond Road isn't very big. You turn left by the old schoolhouse. When you pass the mill, you will know you are on the right road. If you stay at Sugar Bush a week, a day, or only an hour, you will learn about the out-of-doors. You need to move quietly, listen carefully, and watch with keen eyes. If you can't find Sugar Bush don't worry. Most any trail up a mountain, across a valley, or through the woods is all you need to explore the out-of-doors.

As we stopped by the Pond:

> "Pleek!" "Plunk!" "Plank!" The leopard frogs jump into the water when you walk down to Little Pond.
>
> It's fun to watch the dusky-green trout dart through the water. They like worms and caterpillars. When the catfish are tiny you can pick them up in a handful of water plants. How they wiggle and squirm to get back in the water! They travel around the pond in schools — several hundred together.
>
> Forget-me-nots, water hemlock, and meadow rue grow on the banks of the pond. Dragonflies dart among the reeds. Sometimes they capture a fly in a "basket" made of their six legs.

If you have an old kitchen strainer, and scrape the bottom of the pond edge with it, you might find another strange fly. The caddis fly makes a "house" around itself. The house is a hollow tube made of grass or small roots. Touch the tube and the fly will pull himself back into it.

The turtle spends part of his time in the woods and meadows. He also visits the pond. He and a salamander and a little snake may be sunning themselves at the same time.

At night the bull frogs start to sing. Some people think they say, "Jug-of-rum, jug-of-rum." Others think it sounds more like, "Better-go-round, better-go-round."

While you are listening and deciding, the sound of the waterfall and the singing of the frogs will probably put you to sleep. "Jug-o-rum, jug-o-rum, jug-o-rum."

In the Meadow brings a fascinating glimpse of a new family:

A mother rabbit often makes a nest for her babies in the meadow. She digs a small burrow, and lines it with grass and soft fur from her sides. When she leaves her babies, she closes the "door" of the nest with a ball of hay. Each morning and evening, for two weeks, she comes to feed them. One evening she may let them play outside the burrow for a time. It won't be long then until she takes them away.

Hiking Up and Down the Mountain may let you see the bear, or talk with the chickadees or find a priceless bouquet:

While you are resting on a stone you could talk with a chickadee. When he sings, answer him, "Dee-dee-dee." If you make a smacking sound by kissing the back of your hand, he will come closer and closer.

You may want to see the bear. Or you may be just as happy not to see him. Only a few people have caught a glimpse of him. He likes to eat berries. Sometimes he leaves coarse black hair in the brambles and bushes.

You will often come back from a walk with a bouquet of flowers. In summer it could be blue chicory, dainty Queen Anne's lace, some yellow moth mullein with violet selfheal. Blackeyed susan, purple asters, and goldenrod grow along the road. In August you see the scarlet cardinal flowers. They grow in shady spots near the stream.

Winter is a quiet time at Sugar Bush:

If you should go to Sugar Bush in the winter, be ready to stay. You can get snowed in. Being there is fun, even during a winter storm. From every window you can watch the birds come to the feeders. The juncos come in flocks. Nuthatches run headfirst down the trees. Blue jays fuss at each other as they pull the suet from the soap dish tied to the tree. Friendly chickadees swing on the small feeders. Large birds come to the pie tins on the ground.

Bundle up good some day and take a "look and poke" walk. Animal tracks in the snow will tell you who else has ventured out and how fast they were going. Bird tracks are like a lacy design. The birches are white against the gray sky. Only the oaks have a few wrinkled leaves left on them. Pine, firs, and spruce make spots of color. The lichen form gray-green patterns on the bark of trees. Poke down into the snow to find shield ferns and red partridge berries. Scarlet British soldiers grow near the pale fairy cups. If you get thirsty, remember, the red leaves and berries of wintergreen have a cool, fresh taste.

And suddenly it is spring:

Warm days come. The ice melts. Water from melted ice is heavier than other cold water. So it sinks to the bottom of the pond. Gradually the water in the pond turns completely upside-down. The water sinking down takes air with it. Sunshine pours into the pond. The oxygen from the air and the warmth of the sun wake the sleeping creatures. The pond is again brimful of life – and spilling over.[1]

The out-of-doors is all there waiting to be found. But before one can learn from this, the most responsible of environments, the learner has to be someone important and have a sense of identity. As my classes and I talked about migrant children and this, their paramount need, we remembered a general taken prisoner, who, as all his own things were removed from him – watch, ring, wallet, dog tags, uniform – felt that he was losing his sense of identity. So we dreamed up a knapsack to go with each wanderer along the Texas-Ohio Trail. There are maps for following and plotting the journey, books to help one identify the lizards and snakes of Texas, Arkansas' many rocks, Missouri's trees, and the flowers of Indiana. There is a compass which simply won't let you get lost – if you use it correctly, a mirror to help you know who you are, bottles and boxes in which to store and mark flora and fauna, magnetized and peg board games, parts of which won't get lost, something to make music on, books to look at and enjoy whether you read or not, pencils and notebooks for record keeping or just jotting down. These things plus dozens more are in these knobby bumpy packs which could help you, a wanderer, become more nearly yourself as you went from place to place. There would be things to handle, to talk about, to ask about, and even to barter and trade, a task difficult to complete without words.

And if I could, I would also have very special places at each way-station, each stopping place, not inside a building but part and parcel of the out-of-doors. One gaily stripped tent for food and rest and snacks, and perhaps another, a work place for learning. There would be someone ready and eager to help you make up a bit of puppet talk, or hold you while you turned the pages of a book or answer questions even if you weren't quite brave enough to ask them. There would be many boxes – one with dress up things if you were little; or the necessary rudiments of basic charm school learning if you were older. (This implies easy ways of getting to feeling clean and shining with mirrors about for admiring one's self and getting better acquainted.) Some boxes would have toys, others blocks, still others just "things". Parts of the day would be within the tents, but most of it beyond. The setting should be akin to that Madison County farm with all of the small animals collectably and comfortably housed amid hills and trees, brooks and ponds. Those children almost bereft of speech can talk to a cuddly kitten or a fat little puppy, follow roaming ducklings to the water's edge and laugh with glee as they ride a donkey or pony.

Bringing a pet into the life of a speech-locked child can be the needed key. The first sounds of affection I ever heard from one child came as he talked to our lamb.

It is exciting to cook and then eat the product of your efforts. A lot of learning goes into making fifteen servings of Brown Betty or six pans of gingerbread. The nicest party I went to last summer was a jam, butter and biscuit one. The young cooks smacked their lips as they tasted the fruits of their labor. There are many easy side trips which can be rich in learnings for a child in addition to the usual; the museum, the places of business and industry, the farm, the library, and the zoo.

Walking through the woods really noticing, hearing and seeing;

Going to visit a baby – out in the yard in a play pen.

Taking a ride on a street car or bus; if possible, a train or a plane.

Unhurriedly exploring a pond in the spring.

Going through a department or a hardware store.

Knowing all the joy and pain of making choices as one goes on a 50¢ shopping spree (Buying a real rose, mid-winter).

A simple version of a Charm School can do wonders for middle or upper grade girls. My office, in one school, was in one of the areas bordering disadvantaged. The boys and girls of Lincoln School took over all the dull rouine jobs I dreaded. They collated, stapled, and counted out for distribution the Language Arts Bulletins, they handled the library, changed the bulletin boards. Now and then I took a group out for pizza and spumoni plus the leavening of a little salad at one of our best Italian restaurants. The first group of girls I took went into hysterical giggles as a man opened the car door and helped them out. In fact giggles punctuated every activity. With the help of our "Charm School" they learned to enjoy themselves mightily on these excursions, but were not nearly as easily embarrassed.

To listen to a good folk singing group and be invited to join in has been a rewarding, toe-tapping experience. A square dance group demonstrated and finally brought embarrassed boys and shy girls into each square who were soon caught up in the fun of it all. To watch or be a magician's aid, to help make a doll dress, to help build a peanut butter and jelly sandwich, to be an assistant as a hide-away or a tree house comes into being, to discover the comfort of being rocked a bit; these are all rewarding experiences.

One of the amazing things is how much it helps to have one place, one spot that is a child's very own. This can be as simple as a decorated cardboard box clearly marked with a name, a strong cardboard bookcase, a good-sized cubby hole, a locker. Hopefully it should be more than a place to put a sweater – we want many of these children to become short term collectors of valuable (to them) junk. A full length mirror would be the second thing I would add to a room. At first children will laugh at that mirrored self and back a bit away. Best you stand beside them for the initial look so that they can recognize that mirrored self.

Next, get a Polaroid camera. Use it frequently and learn to use it effectively. Let them find a sense of real identity as they observe themselves in photograph after photograph.

And all the time you are working with them "tuck" talk around the doing. Reading, writing, listening, and speaking are really all one; starting and developing hand in hand. These, the language arts, are the areas which open many closed doors. They make the past, the present, as well as time beyond the now, our own. Through them we can know the great people of all times, the near-great, the tawdry, and the lost.

Experiences with language should be pleasant ones. Speaking, with its concommitant listening, is the most important of the language arts for disadvantaged boys and girls. In addition to accepting the child's language patterns the teacher herself will need to do a certain amount of talking – to prime the pump as it were. Within this talk there will be many pauses, many unspoken or quietly offered invitations for others to speak. As in so much of our work with disadvantaged children many talking-listening times should be on a one to one basis.

The one to one situations can at times move to discussions and conversations in small groups. Help a small group of teenagers start to talk; then go away and leave them around a tape recorder. After this you become the student of language as you replay and listen carefully.

We take listening for granted, not giving it the place of importance it deserves in language development. It implies much more than the response to directions and orders. In time, it comes to mean being attentive as teacher and students discuss, suggest, explain, and converse. And always it is the key to learning the way of words and thoughts.

There should be at least one time every day when the teacher reads aloud to every age group – stories, poems, or books. These can be a brush with magic which can open up the whole area of reading and literature and make it a lifelong rewarding experience. Also, this listening time can lead to impromptu improvisations of a play or the lead for a dramatic production.

Tammy, an inarticulate, helped me prepare the mid-morning snack one day. As he held the box of straws up he said, "It looks like a bee hive." These words were immediately incorporated into a three-line story with Tammy's name at its close.

We broke out in a rash of story telling, chart making, and reading. Lynore and Virginia hurried into the room, just a little late. They could hardly wait to tell what they had seen.

It was raining Ginko leaves.
The walk was covered.
There was a solid path of them.

Lee, a mite-sized clown, told this one:

I went fishing with Daddy in Maine.
Something pulled on my line.
I ran to the car yelling, "Help, Daddy, help."
It was a big old fish.
Mommy canned it and it rotted.

These are good stories and there were literally hundreds of them. Only a few things went into their making a time for children to talk and/or write (without fear of being corrected either as to the subject or the patterns of speaking and writing), an appreciative audience (be it only one), someone to notice imagery and to

point out the delightful use of words, and a satisfied feel of having made a genuine contribution.

Van Allen has pointed out that what a child can think can be said; what is said can be recorded; this can then be read and the whole experience re-enjoyed. While doing this boys and girls are learning about the structure of the language and its phonic content as well as starting to read printed material. I would hope that most disadvantaged children can be helped to develop reading skills on an individualized basis, moving from book to book as they move from interest to interest.

We have pushed too early and too hard in the matter of written expression. Some children will develop power in this area quite early in their school careers. They, with the teachers, become the scribes for the whole group.

But there will come a time when each child feels a need to write a message, copy a recipe, make a greeting card, or compose a letter.

There needs to be, always, some real reason to write (like writing a manuscript of a speech for purposes of distribution) and trumped up reasons aren't enough. Too often when someone does write at our insistence we take a red pencil and make critical remarks all over it. This procedure is calculated to alienate all students from putting their thoughts on paper.

We expect all children to be so eternally verbal – we are, we learned this way, yet not all of us are alike.[2] Try giving inexpensive cameras to a group of non-verbal students – then give them an assignment, perhaps "a wall." First photographs will simply show a wall – sky above, earth below. Try it again later. All kinds of subtle variations will come – a small vine emerging from a crannie, the pattern of fallen rocks. Play "who, what when, and were" with camera; or "alike and different." Or give students all kinds of art and junk materials out of which to express feelings – jealousy, anger, hurt, and despair.

Let them listen, script or poem or story in hand, to its being read aloud by record or tape. I wish I could establish many listening posts. Wouldn't it be fun to listen, as you turn the pages of the book, to the school superintendent reading *The Three Tailors?* Let older ones discuss (around a tape recorder) the wording, the appeal, of collected ads from popular magazines and the daily papers. Select any TV show and do an analysis of plot, characterization, climax, etc.

Almost any teacher, and particularly those of the disadvantaged, would do well to set aside testing and the giving of grades. I turn to *Dibs.*[3]

> "What are the purposes of examinations, anyhow? Are they to increase our educational attainment? Or are they instruments used to bring suffering and humiliation and deep hurt to a person who is trying so hard to succeed."

I would also suggest that teachers of the disadvantaged, of all boys and girls, desert the established curriculum and the dreary texts. Introduce the new, experiment with the untried.

Learn to develop jobs and laughter with the group. I was once known as the teacher who played April Fool the very best.

Let the students make plans and activate them either facing their mistakes or anticipating them. One young group was carried away and invited everyone they knew to a watermelon party. As the guests assembled and the hosts viewed the "shrinking" watermelon they calmly invited some guests "to go home now and come back tomorrow." Poor children, they had another difficult time when they decided to show some "outlanders" how delicious turnip greens and cornbread might be. The cornbread recipe was tripled and they purchased what they felt were scads of turnip greens. If you have ever watched greens shrink to almost nothing you know that, again, there had to be two parties.

Don't make these students "pay" for everything they read or do or say by having them fill in blanks, draw lines under, over, around, or between words. We have made it all so "worky" when actually learning is exciting fun.

Make it possible for students to make real decisions. Let there be self-selection. Set up many ways to legally work off tensions and frustration.

Perhaps what I am saying was best summarized by one of my very fine students, Elizabeth Hatcher.

Be pupil-oriented instead of subject-oriented.
Be accepting, believing there is good in every human being.
Do not impose middle-class standards.
Avoid using threats – give needed security.
Have a sympathetic understanding of the results of poverty.
Be sensitive.
Be tolerant.
Have ego-strength.
Have the ability to laugh at one's self.
Be flexible.
Be prepared for conditions before facing them.
Have patience.
Have successful activities – success builds on success.
Work should be interesting and non-tedious.
Work should give immediate gratification.
Use concrete examples – manipulative materials.
Use non-printed material as often as possible.
Develop students' listening ability.
Develop process instead of content.
Use short, compact exercises, especially games.
Do less telling and demonstrating, get pupil involvement.
Invite parents and children to help in curriculum building.

Accept the student's offering however it comes and consider it with him – again on a *one to one basis.* Recognize his mood and give him time. Anyone pushed into a corner has not time to think or consider, to weigh values – he fights back.

Actually the kind of school I visualize would be something akin to a community service center. Laundry and drying facilities would be available as would showers, towels, soap and clean clothes. There would be plenty of good food, haircuts and ever so often a movie. The clinic would be open all day and through the evening.

Class work would be done for the most part on a tutorial or individual basis with frequently

changing flexible groupings. Facilities would be available for every member of the family.

The stuff of learning would be in centers of interest around the swimming pool, in the gym, in a home economics classroom, or the parks, the library, the shop, or classrooms, or even better, in tents or shelters.

Each student would select and pursue avidly the areas of his or her choice. There would be:

Sports:
- Swimming
- Volley and basketball
- Roller skating
- Hop scotch
- Horse shoes
- Judo

- A charm school
- Knitting
- Camping—cooking out
- Table games
- Slimnastics
- First aid
- Practical nursing
- Entertainment
  - Movies
  - Concerts
    - Piano
    - Vocal
- Cooking
- Sewing
  - Simple dress making
- Little theatre
- Puppetry
- Woodworking
- Reading for fun
- Story telling
- Singing
- Square dancing
- Model building
- Practical politics

Text books would be relegated to the tops of cupboards and "things" (realia) could take their place. Books? Yes, many of them – but not as texts. These books would be sources of pleasure, information and delight. Let's look at a few of the examples of "realia;"

- Dishes – make a beautiful plate, cup and saucer.
- A clock, take apart, put together.
- Intercom system.
- Smell – sage, vanilla, coffee, lemon, turpentine, cocoa, celery seed.
- Taste – freshly baked bread, gingerbread, fruit.
- Touch – textures, velvet, plastic, brocade, fur.
- Measuring time and space:
  - Map
  - Ruler
  - Calendar
  - Egg timer
- A branch – beaver tooth marks
- A pine cone
- A rock
- Bird nests – eggs
- Classify:
  - Man-made things
  - Nature made
  - Man adapted
- Kinds of metals

There should be time to hear the squeak of new shoes, the sound of thunder, the thump of hail, the song of the first spring bird, or the nothingness of sound in a snow-covered world.

Talking, listening, and thinking have to be about something – they cannot occur in a vacuum. Some boys and girls are concept locked. There is so much they need to find out about this world, its laws, its lands, and its many creatures – human and otherwise. They must have abundant first-hand experiences – opportunities to taste, touch, see, hear, and smell. They need help in learning to gather meaning, someone to sniff the flowers with them, someone to also relish the taste of gingerbread, someone to give them earphones and special glasses. And they need to find the tools of learning in things, realia, rather than in text and tome.

Disadvantaged boys and girls need to live in an environment that is rich, stimulating, and varied. Things help greatly. Two toy telephones come next on the list of necessities for young children. Hats of all varieties help, and it's our job to see that heads are in such a condition that hats can be exchanged. Puppets and a stage to hide behind have helped many a shy speaker.

Adults and information would be handy and "on call" at any time, offered as the need appeared. A "teacher" might help children look back at the last lap of their journey, explore where they are now with them and then let them roam and do and find out. There might be a session or two on looking ahead to the next journey, the making of new state passports, talking one to one or one to two, about the joys and difficulties of travel, the building of a tree house, the taste of the last batch of cookies. Reading could well be confined to experience material, such as the story of Sugar Bush and even from paperbacks – any of which could go along with the traveler. Listening to wind, to thunder, to bird song and animal hiss, to a strumming guitar, to each other, to trustworthy adults, are an important part of learning. Once someone has held you safely in the crook of an arm and helped you see the flash of red that is a cardinal, or helped you touch the softness of a bunny and admire his delicate ears, then you can gather more and more meaning about all of life – and this, the gathering of meaning is the best of learning.

If you stay at Sugar Bush a week, a day, or only an hour, you will learn. If you can't find Sugar Bush, don't worry. Most any trail up a mountain, across a valley, or through the woods is all you need.

Welcome them to your own unique Sugar Bush – let them live there freely and happily, learning all the while.

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[1] These materials were taken from a series of articles written by Mary Harbage, published by *Scholastic Magazine* in *Explorer*, Oct. 21, 1959 (Vol. 5, No. 6) and March 16, 1960 (Vol. 6, No. 7).

[2] We have been saying this for years. When will we really believe it and adapt our practices in terms of the belief?

[3] Virginia Axline—*Dibs in Search of Self*. Boston: Houghton Mifflin, 1964.

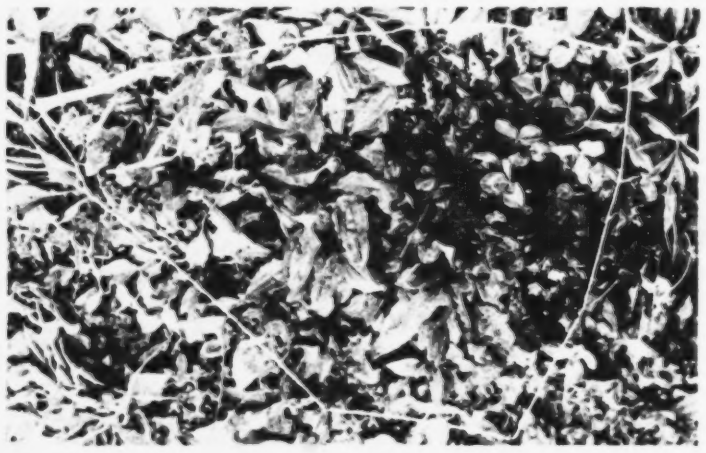
Nature's Communities on the School Grounds

Students cannot be taken to an outdoor education center, or a state park, or even a community park, everytime the out-of-doors is needed to illustrate a point or develop a concept. For that reason, conference participants visited the yard and playground of Mills Lawn Elementary School where the Glen Helen teacher-naturalists pointed out many possibilities for developing outdoor education concepts. Similar exploration of nature's interrelated communities can be conducted by a classroom teacher on any school site – no matter how small the premises or how expansive the hard-surfaced areas.

Suggestions by the teacher-naturalists and by Harry H. Feldman, Director of the Outdoor Education Center, are organized below in a manner that should be readily usable by both teachers who attended the conference and those who did not. Adaptations and additions should, of course, be made to fit local situations.

Plants

Locate miniature plant communities on various parts of the school grounds – arid areas along paths, meadows in lawns, swamps in poorly drained low spots, thickets along fence rows.



Learn to recognize various levels of plant life, from the smallest to the most complete – fungi, algae, lichens, and mosses; clover and other acid plants; grasses; vines; shrubs (multiple-trunk plants); trees (single-trunk plants).

Relate where different kinds of plants appear to grow best according to soil, moisture, and sunshine.

Identify various plants on the school grounds and discuss their function, if any.

Place a loop of string (or a coat-hanger circle) on the ground in various locations and have students count the different kinds of plants encircled or name as many plants as possible.

Encourage students to recognize familiar plant forms by the sense of touch.

Discuss why the collection of flowers, leaves, and plants can be harmful to plant communities.

Study the structure of seeds and their dissemination – whether airborne, dropped, or carried by animals or insects.

Discuss the importance of roots in stopping erosion.

Study what happens in flower beds and flower boxes – including leaching, freezing and thawing, changing water levels.

Discuss which plants were introduced to the grounds by man and which were brought in by wind, birds, or insects.

Learn to recognize plants to which man is sensitive – poison ivy, poison sumac, nettles.

Study how different varieties of plants, such as grasses and shrubs, are developed for special purposes.

Observe the selection and placement of plants for landscaping purposes.

Discuss which plants are often called "weeds" and why.

Look for tiny plants (algae, mosses, lichens, and fungi) on rocks and walls.

Observe the effect that trees and shrubs have on smaller plants that grow (or try to grow) beneath their branches and among their roots.

Examine various flowers and identify various parts such as the calyx, corolla, petal, pistil, stamen.

Discuss the effects of burning vegetation.

Trees

Discuss tree characteristics and their significance – leaves or needles, evergreen or deciduous, smooth or rough bark, straight or crooked trunk, alternate or opposite branching, blossoms, fruits, roots.

Learn which trees are coniferous (cone-bearers).

Study leaf or needle characteristics – shape, alternate or opposite branching, round or square stem.

Identify common trees by name through observation of general apeparance or through study of their leaves, flowers, seeds, and bark.

Learn which trees are native to the area.

Relate the size of similar trees to the availability of space and sunlight.

Throughout the year, observe the colors and textures of leaves and discuss reasons for change.

Discuss the photosynthesis process that takes place within leaves.

Find seedlings and discuss how tree life begins.

Discuss ways of telling tree age – general size, height of major branches, tree rings.

Examine damaged and decayed trees for such things as damage by man or nature, total or partial decay, disease, old age.

Discuss reasons for selective cutting, limb removal, tree surgery, pruning.

Observe places where squirrels, woodpeckers, or insects have been attracted to decaying parts of trees.

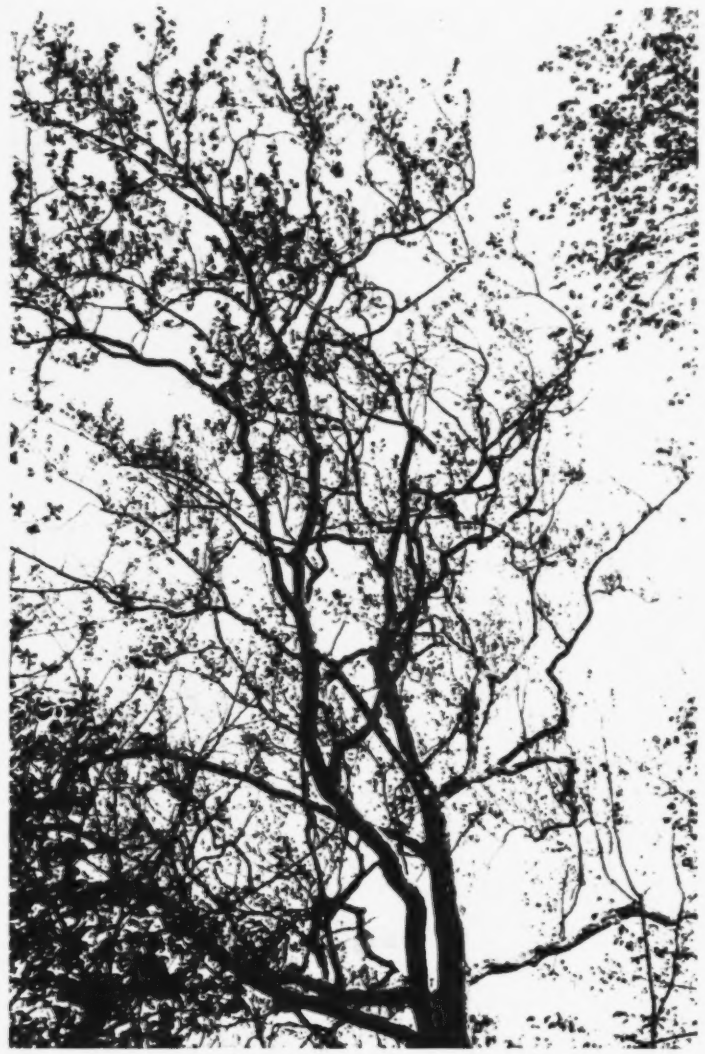
Look for other plant life in trees – vines, mosses, lichens.

Find sucker branches starting around the base of trees or stumps and discuss this type of growth.

Compare the growth of a tree growing in a graveled or hard-surfaced area with a similar one in a sodded area.

Study decomposition in a tree stump noting plants that grow in the new soil.

Discuss uses of trees – shade, beauty, shelter for animals, timber.

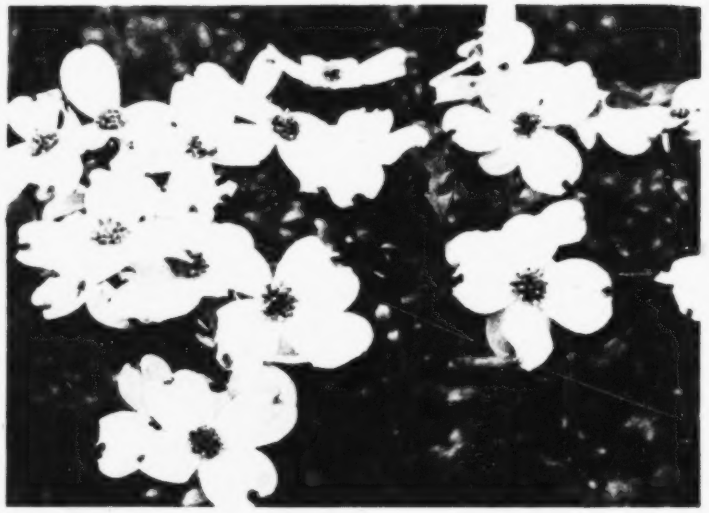


Plant one or more trees on the school grounds after studying the suitability of the type of tree for the selected site(s).

Discuss the need for "forest" management on the school grounds, including removal of undesirable or unsafe trees and replacement.

Talk about "weed trees" such as the ailanthus (trees of heaven) which has ill-scented flowers.

Collect needles, leaves, barks, and seeds for displays.



Shrubs

Discuss which plants are trees (single trunk) and which are shrubs (multiple trunks).

Identify common shrubs by name through observation of general appearance, flowers, and fruits.

Adapt suggested activities related to trees for development of outdoor education concepts.

Animals

Look for evidence of animal life – bird nests, squirrel dens, cocoons, chrysalises, pupa cases, holes bored by birds or insects, chewed leaves, egg deposits, webs, galls on plant leaves or stems, deposits left by animal life.

Learn to recognize birds that visit the school grounds through observation of their appearance and study their nesting, feeding and migratory habits.

Study various insects — their identifying characteristics, habitats, and effects on other living things.

Discuss the insect populations in various areas — grassy areas, on trees, around shrubbery, near walls or hard-surfaced areas — and relate to the food chain.

Compare creatures that work during the day with those that work at night.

Observe habitat changes throughout the year – in trees, holes, brush piles, lawns, swampy areas.

Study the role (niche) of each creature in the total environment.

Provide opportunities for students to handle or touch selected small creatures found on or near the school grounds.

Soil

Observe how soil is formed by decomposition of trees and other plants – in a tree stump, under a fire escape, at the corner of a step – anywhere that vegetation is breaking down.

Observe how soil is formed by deterioration of rocks – where wind or water erosion is affecting larger rocks, where traffic (vehicular or pedestrian) is breaking down crushed rock or gravel, where mosses or larger plants are beginning to take hold.

Study types and characteristics of different soils found on the school grounds.

Test samples of soil for acid and alkaline content.

Discuss methods of changing soil structure – with top soil, fertilizer, lime, compost, manure.

Observe the percolation (seepage) of water through sand and other soils and discuss moisture-holding capabilities.

Look for examples of soil erosion – in ditches or low spots, on hillsides or slopes, on ball fields, beside roadways or sidewalks, in culverts.

Discuss the reasons certain areas are eroded and what could be done to prevent further damage.

Discuss the role of roots in controlling erosion.

Use sand or dirt to show land forms (mountains, hills, valleys); to illustrate erosion (muddy run-off, ditching, undercutting); to show types of erosion control (terraces, sodded run-offs, strip farming); to demonstrate wind flow.

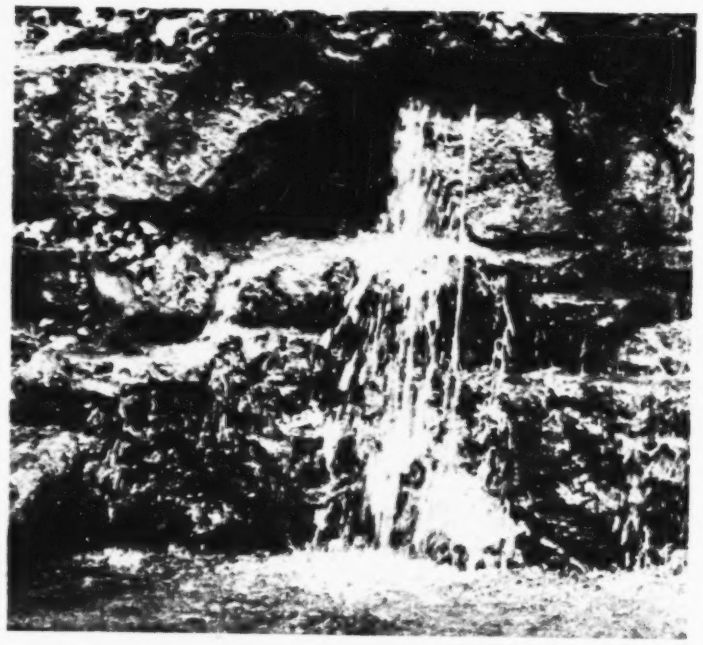
Look for the effects of soil erosion on the plant community – exposed tree roots, sediment-covered plants.

Study the effects of packed soil around swings, slides, and other playground apparatus.

Observe cracks in soils and discuss possible causes.

Point out soil layers in a highway cut, an eroded area, a cliff, or a hole.

Study what soil is made from (usually roots, larvae, plants, and rock particles) by putting



a handful into a jar of water and watching particles sift to the bottom, stay suspended, or float.

Rocks

Learn to recognize common rocks and study about their origin.

Examine rock layering.

Discuss the effects of wind, water, and temperature on rocks.

Look for fossils, either on rock surfaces or inside rocks that have been broken with a hammer.

Test rocks for degree of hardness – by scratching or by use of chemicals.

Water

Observe the general drainage of various areas of the school grounds, including both natural and man-made runways and basins.

Study drainage paths from water fountains.

During or just after a rain, observe miniature rapids, grass waterways, and run-off along paths and driveways.

Observe various watershed areas (hard-surface, gravel, grass) and relate what is seen to slope, speed, and splash.

Discuss areas with poor drainage, with natural wet spots, with stagnant water.

Examine debris collecting along flood lines and find signs indicating the highest level of the water.

Compare the rate of evaporation on a hot sidewalk with that on grass.

Observe what happens to plants with inadequate moisture and with too much moisture.

Observe plant and animal life in swampy or still water areas and in areas with moving water.

Investigate the role of water in the school building—how water gets in, what it is used for, how it is disposed.

Discuss how rain water runs off the building and from the grounds.

Use a water testing kit to test various water samples—rain water, drinking water, river water.

Use water samples for microscopic study.

Wind

Look for examples of wind erosion and wind damage to land or facilities.

Discuss the benefits of wind—drying soil and plants, carrying seeds, influencing weather.

Compare the effects of wind on bare soil (ball fields), grassy areas, and rocks.

Discuss how man changes the flow and effect of wind (either intentionally or inadvertently)—rows of trees or shrubs, long buildings or walls, "canyons" between buildings, streets as "tunnels," terracing.

Talk about wind as factor in air pollution.

Study cloud formations and relate to weather predictions.

Ecology

Discuss ecological patterns—the interrelationships of organisms and their environments.

Look for examples of the balance of nature—the dependency of plants and animals upon each other, food chains, interdependent habitats.

Discuss food chains—e.g., from grass to cow to man or from grass to insect to frog to snake to hawk.

Study the succession of plant and animal life on various areas—those beginning as barren earth around a new building; as burned-off or eroded areas; as grass in a shady, swampy area; as grass in a sunny, well-drained area.

Compare areas with an abundance of plant and animal life with areas in which such life is scarce—for example, a fence row and a playing field.

Discuss how plants and animals adapt to their environment—persistent seeds find bits of soil in walls, rocks, or hard-surfaced areas and grow; plants with ground-level life centers (e.g.—dandelions) survive in mowed areas.

Observe ways nature "hinders" man and his progress—tree roots in water and sewer lines; freezing and thawing of asphalt, concrete, and walls; weather that sometimes ruins crops and gardens; animals that bite man; plants that cause rashes or allergies.

Discuss ways man "helps" nature—structures that are windbreaks; debris that shelters animals; provision of bird houses, feeding trays, and bird baths; addition of water during dry periods; removal of diseased or dead branches from trees; addition of "plant food" to soil.

Talk about ways man "hinders" nature—air and water pollution; sewage and waste disposal; insecticides and fertilizers; debris that will not decompose; mowing grass (which destroys homes for wildlife and prevents seed development); damage to trees with nails, wires, and ropes; removal of soil-building materials (dead trees and plants).

Observe how everything man uses has its origin from the earth—sidewalks, driveways, walls, buildings, fixtures.

Discuss multiple uses and multiple sharing of land areas by man, plants, and animals.